

remains of the hippopotamus, in particular, are so frequent, that in an area of 120 square yards, as many as six tusks of that animal were found along with various others of the bones, tusks, and horns that have been mentioned.

One horn of an ox measured as much as four feet six inches in length, and five inches in diameter at the base; and the size of this, it is observed, is the more remarkable, as another horn of an ox was found near it, only six inches long; but it is added, that they all appear to have been deposited as mere bones without the flesh; for in no instance have two bones that are connected in the living animal been found together. Although these bones have lost their cohesion, as if perished by lying long in a moist stratum, they do not seem worn in any degree, as would have happened if they had been washed by the sea for any length of time.

The third stratum in this field is sandy loam, highly calcareous, containing horns, bones, and teeth of deer and oxen, with snail-shells, and shells of river fish.

Below this stratum follow the gravel and clay corresponding to those of the other field; but as the existence of these has been ascertained solely in digging for water, it is not known, by actual examination, whether the organic remains which they may contain are of the same kinds.

*On a new Construction of a Condenser and Air-pump. By the Rev. Gilbert Austin. In a Letter to Sir Humphry Davy, LL.D. F.R.S. Read March 11, 1813. [Phil. Trans. 1813, p. 138.]*

Mr. Austin's object in constructing this apparatus was to impregnate fluids with any condensible gas by the aid of compression; and for the sake of preserving them in a state of purity, every part was made, as far as possible, of glass. The retort, in which the air is formed; the reservoir, in which the supply is contained; the straight tube, through which it is conveyed, and which serves as a piston; the cylinder and barrel of the pump; the receiver, containing the fluid to be impregnated; and the valves that confine it,—are all made of glass, the only exception being the stuffing of the piston, for which he names various soft materials that may be advantageously employed.

For the sake of greater simplicity in the construction, all the parts are arranged in the same vertical line. The reservoir at bottom, in which the air is first collected, is a large bell, with a perforation at the top, where it is connected with the glass rod, which serves as a piston. These are firmly fixed in position; for in this instrument, the condensation is effected by moving the barrel upon the piston, instead of having a fixed barrel with a moveable piston. Accordingly, the receiver, which is attached to the upper extremity of the glass barrel, is carried up and down with it in effecting the condensation.

The great impediment to forming pneumatic instruments of glass

appears to the author to have been the difficulty of making the joinings sufficiently firm to bear the necessary pressure, and at the same time capable of being easily disunited for the purpose of making any new arrangement of the parts ; for in both these respects, as well as in other points, the usual conical joints of glass are very objectionable.

In Mr. Austin's construction, all the parts are fitted together by plane surfaces, which have the advantage, not only of being easily formed, but of fitting each other in any order of combination in which it may be thought convenient to place them. For this purpose, each part of the apparatus, where there is need of a joint, is originally made by the glass-blower to terminate in a flat, thick, circular plate of glass of a given diameter, that is larger than the neck to which it is attached.

The flat terminations of all the parts being then ground perfectly plane, any two may be applied together, and clamped by a proper system of collars and screws, with the certainty of fitting, without regard to any inequality of the perforations in each, through which the communication between the vessels is thus established.

The clamps employed by the author for connecting his apparatus, consist of two flat circular collars of brass, just large enough to admit the circular flat flanges to pass through them, and a pair of mahogany collars of smaller dimensions, so as to fit the necks after they have been sawn in two. The brass collars, having been first put upon each vessel, are prevented from returning by the interposition of the wooden collars, and are then screwed together by a suitable number of screws. In rendering these joints perfectly secure, it is necessary to turn all the screws with nearly equal force ; and it may sometimes be expedient to moisten the surfaces of glass that are applied to each other when any great degree of condensation is required.

The tube through the piston terminates, at its upper extremity, in a small cup, which is the segment of a sphere, and contains a plane convex lens, ground to the same radius, and fitting so as to perform the office of a valve. A similar valve is placed between the barrel and the receiver, and another as safety-valve at the top of the receiver, with a spring and screw to regulate the force of condensation that may be applied.

Since the motion of the barrel on the piston is required to be performed with extreme steadiness, it is firmly attached by strong collars to an iron sliding-bar, guided by a dove-tail groove of brass, fixed to an upright pillar that stands on the platform, to which the first reservoir and piston are attached, so as to avoid all possibility of lateral motion that might destroy the apparatus.

The author observes, that if the undermost vessel, instead of being open as a reservoir for air to be condensed in the uppermost, be closed at the bottom, it will be exhausted, so that the same instrument serves the purpose of an air-pump as well as a condenser.